

Title: The Great Geospace Observatory and Simultaneous Missions of Opportunity

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Abstract:

A predictive understanding of the sun to geospace environment is one of the main goals of ILWS. This can only be achieved through a "system-level" approach, meaning long-term, simultaneous, continuous observations across the relevant scales of the magnetosphere and ionosphere/thermosphere (IT). To date such an approach, which must involve simultaneous, multi-scale, global imaging of different geospace regions, has not been carried out for a complete geomagnetic storm. Such imagery, now routine for the Solar community, is of critical scientific importance and captures public imagination. Its absence in geospace studies has limited the growth and impact of geospace science. In this presentation, we discuss a concept called the Great Geospace Observatory, which would involve coordinated geospace imaging through an international effort of multiple, simultaneous Missions of Opportunity. In this way, the cost would be spread among different agencies as well as putting remote sensors in vantage points optimized for each type of imaging. 24/7 auroral imaging from weather satellites on Molniya (or similar) orbits, EUV imaging of the plasmasphere from high-inclination orbits, continuous and global ENA imaging from geosynchronous commercial satellites, and continuous X-ray imaging of the cusp and magnetosheath from a high-altitude dedicated probe would quantitatively track system-level dynamics at through substorms, sawtooth events, steady magnetospheric convection, and storms; studying energy and mass coupling between the solar wind, magnetosphere, and the upper atmosphere. In our minds, The Great Geospace Observatory represents the next strategic step for ILWS and needs to be seriously considered.